BROOKHAVEN NATIONAL LABORATORY

(USDOE)
NEW YORK
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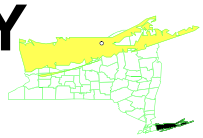

EPA REGION 2
CONGRESSIONAL DIST. 01
Suffolk County
Upton

Other Names:
BNL

Site Description

The Brookhaven National Laboratory (BNL) site is a research and development facility covering 5,265 acres in Upton, at the center of Long Island. The Army used the site as Camp Upton during World Wars I and II. Since 1947, BNL has been operated by contractors first to the Atomic Energy Commission and now to the U.S. Department of Energy (USDOE), the site owners. Since March 1998, Brookhaven Science Associates has run BNL for the USDOE. BNL conducts basic and applied research in high energy nuclear and solid state physics, fundamental material and structure properties and the interaction of matter, nuclear medicine, biomedical and environmental sciences, and selected energy technologies. To conduct this research BNL designs, builds, and runs installations for scientific research, such as particle accelerators and nuclear reactors. Most of its main facilities comprise an area of approximately 900 acres near the center of the site. Outlying facilities cover about 550 acres and include the hazardous waste management facility (HWMF), agricultural research fields, landfill areas, and a sewage treatment plant. The remainder of the facility is largely wooded. BNL lies over groundwater that is designated as a sole source aquifer. BNL, the Suffolk County Water Authority, and private well users draw drinking water within 3 miles of the facility. Recently, about 1600 users of private wells south of BNL have been connected to public water. The headwaters of the Peconic River are on BNL property in a freshwater wetland upgradient of the known areas of concern. Surface water within 3 miles downstream of the site is used for recreation.

Site Facts: The USDOE, the EPA and the New York State Department of Environmental Conservation (NYSDEC) have negotiated an Interagency Agreement to investigate and clean up environmental problems at BNL. It became effective in May 1992.

Responsibility:

This site is being addressed by USDOE through Federal actions.

NPL LISTING HISTORY
Proposed Date: 07/13/89
Final Date: 11/21/89

Threats and Contaminants

Past practices, accidents and releases from aging facilities at BNL have resulted in a number of areas where contamination is known or suspected. Twenty-nine Areas of Concern (AOCs) have been identified. On-site soil is contaminated with volatile organic compounds (VOCs), heavy metals, polycyclic aromatic hydrocarbons (PAHs), and radioactive materials including cesium-137, strontium-90 and tritium. On-site and off-site groundwater is contaminated with VOCs, radionuclides, and ethylene dibromide (EDB), a pesticide and fumigant. On-site, contaminated drinking water wells have been closed or treatment systems have been added, reducing the potential for drinking polluted water. VOCs in off-site groundwater exceed Federal and State drinking water standards, so the USDOE has connected neighboring properties to public water as a protective measure until the final cleanup is complete. Radionuclides in off-site groundwater do not exceed Federal or State standards. The USDOE has established a program through the Suffolk County Department of Health Services to conduct testing of residential wells. Sediments in the Peconic River on-site are contaminated with metals and low levels of radionuclides as a result of historic releases from the sewage treatment plant.

Cleanup Approach

The BNL site is large and complex. The site is being addressed in phases to take actions quickly and respond to the highest priorities first. The cleanup approach combines removal actions, which allow quick action, with remedial actions, which require extensive investigation and usually lengthy cleanup. The combination of remedial and removal actions allows a faster response, but ensures that all contamination is addressed. Twenty-nine AOCs, where known or suspected contamination exist, have been grouped into several removal actions and six Operable Units that will follow the longer remedial process. “Operable Unit” is an administrative name for smaller geographical areas of the site that have similar types of pollutants or the same affected media. The earliest actions have focused on removal actions to prevent public exposure to contaminated groundwater, stabilization of contaminated groundwater, and removal of sources of groundwater contamination and highly contaminated soil. Later actions will lead to overall remediation of the entire site. A series of Records of Decision (RODs) are expected during the period 1996 through 2001. The RODs will select the final cleanup remedies for the Operable Units. As new information becomes available, the cleanup approach and priorities are reevaluated to ensure that the worst problems are addressed first. The cleanup approach seeks stakeholder involvement in the actions and priorities at the site.

Response Action Status

Source Removal Actions: The USDOE is planning or has completed removal actions on sources of groundwater contamination or areas of highly contaminated waste or soil. These removal actions include the following:

Construction soil: Contaminated soil was discovered during construction activities, excavated and disposed of off-site. In January 1992, oil and PCB contaminated soil was discovered near Building 479. Approximately 260 cubic yards of contaminated soil were removed and disposed of before work was completed in August 1992. In May 1993, mercury and PCB contaminated soil was discovered during the excavation of an abandoned catch basin at Building 464. Approximately 252 tons of soil was excavated and shipped off-site for treatment and disposal.

D Tanks: In July 1993, the USDOE prepared an Engineering Evaluation/Cost Assessment (EE/CA) and Action Memoranda for the removal of three 100,000 gallon radioactively contaminated tanks and in March 1995 the dismantlement and packaging of the tanks was completed. The tanks were disposed at the USDOE's facility in Hanford, Washington.

Underground Storage Tanks: Several underground storage tanks have been removed since 1990. In 1998 a tank containing carbon tetrachloride residue was removed. Additional radioactive waste storage tanks are currently being removed.

Cesspools: In spring of 1994, the USDOE finalized an EE/CA and Action Memoranda for the removal of contaminated cesspools. Twenty-five contaminated cesspools have been removed, eliminating a source of groundwater contamination.

Landfills Closures: Three on-site landfills were used historically to dispose BNL waste. The Former Landfill Area received up to 3 tons of wastes each day until its closure in 1966. A small percentage of these wastes were hazardous or radioactive and included laboratory debris, equipment, clothing, animal carcasses, sewage sludge, and sanitary wastes. The Current Landfill began operating in 1967 and closed in 1990, accepting garbage, other solid waste, and building materials. Limited quantities of low-level radioactive materials were accepted until 1978. The Interim Landfill operated from 1966 to 1967 and received similar waste. An EE/CA for the landfills was completed in March 1995. These landfills have all been closed and covered as removal actions, preventing further contamination of the groundwater and erosion of the waste.

Glass Holes and Chemical/Animal Pits: During the Summer of 1997, the USDOE cleaned up fifty five holes and pits where laboratory waste was disposed. The holes and pits were excavated and all contaminated material will be sent off-site for treatment, if necessary, and disposal. Excavation of these holes has eliminated a source of groundwater contamination.

Brookhaven Graphite Research Reactor: In Fall of 1999 and Winter of 2000, removal actions were started on two areas associated with the reactor. Removal of the pile fan sump and above grade ducts will eliminate a source of groundwater contamination and remove sources of direct radiological exposure.

Groundwater Removal Actions:

VOCs: Monitoring data showed that volatile organic groundwater contamination had migrated off-site south of BNL. The USDOE tested hundreds private wells to ensure that the public was not drinking contaminated water. Seven residences were immediately provided with bottled water or connected to public water because contaminants above drinking water standards were found in the wells. In December 1995, the USDOE proposed to hook up to public water areas south of BNL where private wells are in use. Hook ups started in April 1996. The hook ups are a precautionary

measure to protect neighborhood residents from the possibility that their wells might draw contaminated groundwater while the cleanup is underway. In December 1996, the USDOE started a system to pump and treat one plume of contaminated groundwater at BNL's boundary to prevent additional off-site groundwater contamination south of the site. A system to pump and treat a second plume of organic contamination started operating in June 1997. A third system located off-site in an industrial park south of BNL started operating in September 1999.

Tritium: In early 1997, monitoring data revealed a plume of tritium contaminated groundwater from the High Flux Beam Reactor. Tritium, radioactive hydrogen that forms water, was leaking from the spent fuel pool within the High Flux Beam Reactor. The plume of groundwater contaminated with tritium is confined to the central portion of BNL far from the downgradient southern boundary and is not an immediate threat to drinking water off-site. In May 1997, a system to pump the leading edge of the tritium plume was started as an interim action to prevent any further movement of the tritium and to ensure that the contamination remains entirely on-site. The contaminated water is being recharged on-site at levels below the Federal and State standards farther from the site boundary. The spent fuel has all been shipped off-site and the water was drained from the fuel pool, eliminating further leaks. The reactor is currently shut down and the USDOE has decided not to restart the reactor.

Remedial Actions: The USDOE, EPA and NYSDEC have studied the BNL facility and identified twenty-nine AOCs which have been grouped into six Operable Units providing a phased approach to cleaning up the site. The USDOE will investigate the extent of each Operable Unit's pollution problems and will recommend the best strategies for final cleanup. Schedules for site cleanup are established under the Interagency Agreement.

Operable Unit I - Waste Management Area: The remedial investigation was completed in Summer of 1996. The HWMF within this Operable Unit contains extensive radiological contamination of the soil. A cleanup proposal was presented to the public in Spring of 1999, and a final remedy was selected by the USDOE, EPA and NYSDEC in a Record of Decision in September 1999. The remedy requires excavation and off-site disposal of the contaminated soil, wetland restoration, monitoring, and site use control. Remedial action is scheduled to begin FY02.

Operable Unit II - BGRR Areas/AGS Scrapyard: This Operable Unit addresses scattered areas of radiologically contaminated soil throughout BNL. The remedial investigation was completed in late 1996. In order to select a consistent remedy for all radiologically contaminated soil, the final remedy was evaluated and selected with Operable Unit I. The USDOE started the design of this remedy in Spring of 2000. Remedial action completion is scheduled for FY02.

Operable Unit III - Sitewide Groundwater: This Operable Unit addresses extensive groundwater contamination throughout BNL. On and off-site VOC groundwater contamination was discovered during the investigation and removal actions have been taken to prevent further contaminant movement and protect the public. The tritium plume from the High Flux Beam Reactor has been added to this Operable Unit. Also, plumes of strontium-90 contamination from the old reactors and waste disposal units will be addressed in this Operable Unit. The final Record of Decision was signed June 20, 2000. The final groundwater remedy consists of various pump and treat systems (for the VOC, tritium and strontium plumes) with some off site disposal of highly tritiated water at the High Flux Beam Reactor. The remedy also incorporates several ongoing removal actions. Remedial

designs for the groundwater remedies began in October 2000 and pre-design characterization and/or pilot studies commenced August 2001. Remedial action is scheduled to begin FY02.

Operable Unit IV - Central Steam Facility: This Operable Unit addresses soil and groundwater in the central part of BNL contaminated with VOCs from a ruptured tank. The Remedial Investigation and Feasibility Study are complete. The USDOE issued a Proposed Remedial Action Plan in December 1995, and the Record of Decision selecting the remedy was signed in March 1996. The USDOE is using air sparging and soil vapor extraction to clean up VOCs in soil and groundwater. The remedial design is complete, the system is constructed and operation of the cleanup started in Fall of 1997. During the investigation, the USDOE removed and disposed off-site about 1,400 tons of contaminated soil.

Operable Unit V - Peconic River/Sewage Treatment Plant: This Operable Unit addresses the contaminated sediments in the Peconic River and the sewage treatment plant. However, because of scheduling differences between the two sites they were separated. The sediments in the Peconic are known to be contaminated with mercury, silver, and PCBs and low levels of radionuclides such as cesium-137. Samples were taken in the Peconic River on BNL and all the way down the river to the Peconic Bay to assess radiological contaminants. The USDOE issued a Proposed Remedial Action Plan to the public in February 2000. Public comments requested further investigations of various alternatives. In October 2001 pilot studies began and will continue through May 2002. Pending results of the studies a final result will be proposed. The final ROD is expected the Winter of 2003. Regarding the Sewage Treatment Plant, in January 2002, a ROD was signed approving excavation. Remedial design and remedial action will follow.

Operable Unit VI - Upland Recharge Area: Agricultural testing at BNL resulted in GW contamination with EDB. In fall of 1996, the USDOE proposed an alternative to clean up EDB in groundwater. As a precautionary measure, the USDOE provided connection to public water in the area where the groundwater contamination is expected to move off-site. No one is currently drinking the contaminated water. More data has been gathered since 1996 and a final remedy was selected in March of 2001. Remedial design has begun and remedial action will follow.

Cleanup Progress

The USDOE has largely made environmental progress by planning and completing the actions discussed above. The following threats have been mitigated by physical cleanup work:

PCB Contaminated Soil - In summer of 1992 about 260 cubic yards (about 162 tons) of PCB and oil-contaminated soil was excavated and disposed off-site. This eliminated potential exposure to on-site workers and movement of the contaminant to groundwater.

Mercury Contaminated Soil - In spring 1993 approximately 252 tons of mercury contaminated soil were excavated and treated and disposed off-site. This eliminated potential exposure to on-site workers and movement of the contaminant in the environment.

Operable Unit IV - In spring of 1994, about 1400 tons of visibly contaminated soils containing oil and solvents were removed and disposed off-site. Construction of the soil vapor extraction/air sparge system selected in a March 1996 Record of Decision was completed in November 1997 and the

system is operating to remove VOCs from soil and groundwater. The system has removed approximately 24 pounds of VOCs.

Cesspools - Since spring of 1994, twenty-five contaminated cesspools and the contents have been removed and disposed off-site. This has eliminated potential sources of groundwater contamination.

Current Landfill - During the summer and fall of 1995 the 8-acre Current Landfill was covered with a low permeability cap. This eliminated a source of groundwater contamination.

Former Landfill Area - During the summer and fall of 1996 the 12-acre Former Landfill Area was covered with a low permeability cap. This eliminated a source of groundwater contamination.

VOC Contaminated Groundwater - Three groundwater pump and treat systems are in operation, the first since December 1996, the second since June 1997, and the third since September 1999. These systems have extracted and treated roughly 1.7 billion gallons of VOC contaminated groundwater, with over 1,200 pounds of contaminants removed. Approximately 50,000,000 gallons of contaminated groundwater are treated each month.

Tritium Contaminated Groundwater - Since May 1997 a groundwater extraction and reinjection system has managed roughly 116,000,000 gallons of tritium contaminated groundwater, providing hydraulic containment. In December 1997 the source of the groundwater contamination, the spent fuel pool at the High Flux Beam Reactor was drained of about 65,000 gallons of radiologically contaminated water.

Interim Landfill - During the summer and fall of 1997 the 1-acre Interim Landfill was covered with a low permeability cap. This eliminated a potential source of groundwater contamination.

Chemical/Animal Pits and Glass Holes - During the summer and fall of 1997 roughly 20,800 tons (13,000 cubic yards) of contaminated soil and laboratory debris were excavated from approximately fifty-five disposal holes and prepared for eventual off-site disposal. Contaminants include pesticides, metals and radionuclides. This has eliminated sources of groundwater contamination and removed highly contaminated material for disposal off-site.

Carbon Tetrachloride Tank and Groundwater - In the Fall of 1998 a tank that contained residues of carbon tetrachloride was removed and disposed off-site. Groundwater in the immediate vicinity is highly contaminated as a result of releases from the tank. Pumping of the contaminated groundwater started in February 1999. Approximately 9,000 gallons of contaminated water have been treated, removing about 7 to 8 gallons of carbon tetrachloride.